

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kansas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *seventeen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW* [THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT THEREFROM,] TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS CERTIFIED SEED AND. (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS OF THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

* [Waived]

ALFALFA

'Riley'



In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington this 31st day of July in the year of our Lord one thousand nine hundred and eighty.

Attest:

Edward L. Lane
Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

[Signature]
Secretary of Agriculture

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: See Reverse.

| | | | | | |
|--|--|--|---|---|---------------------------------------|
| 1a. TEMPORARY DESIGNATION OF VARIETY KS43 | | 1b. VARIETY NAME Riley | | FOR OFFICIAL USE ONLY PV NUMBER 7800099 | |
| 2. KIND NAME Alfalfa | | 3. GENUS AND SPECIES NAME Medicago sativa L. | | FILING DATE 8-21-78 | TIME 8:00 A.M. |
| 4. FAMILY NAME (BOTANICAL) Leguminosae | | 5. DATE OF DETERMINATION 9/16/77 | | FEE RECEIVED \$ 250.00 \$ 250.00 \$ 250.00 | DATE 8-21-78 8-21-78 7/14/80 |
| 6. NAME OF APPLICANT(S) Kansas Agr. Exp. Sta. | | 7. ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) Waters Hall, Kansas State Univ. Manhattan, Kansas 66506 | | 8. TELEPHONE AREA CODE AND NUMBER 913-532-6147 | |
| 9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: (Corporation, partnership, association, etc.) University | | | 10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION | | 11. DATE OF INCORPORATION |

12. Name and mailing address of applicant representative(s), if any, to serve in this application and receive all papers:
Dr. Hyde Jacobs, Head, Dept., of Agronomy, Kansas State University, Manhattan, KS.;
66506 Phone (913) 532-6101

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- ☒ 13A. Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)
☒ 13B. Exhibit B, Novelty Statement.
☒ 13C. Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.)
☒ 13D. Exhibit D, Additional Description of the Variety.

14A. Does the applicant(s) specify that seed of this variety be sold by variety name only as a class of certified seed?
(See Section 83(a). (If "Yes," answer 14B and 14C below.) ☒ YES ☐ NO

14B. Does the applicant(s) specify that this variety be limited as to number of generations?
☒ YES ☐ NO

14C. If "Yes," to 14B, how many generations of production beyond breeder seed?
☒ FOUNDATION ☐ REGISTERED ☒ CERTIFIED

15. Does the applicant(s) agree to the publication of his/her (their) name(s) and address in the Official Journal?
☒ YES ☐ NO

16. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be deposited upon request before issuance of a certificate and will be replenished periodically in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

7/17/78
(DATE)

Alfred W. Smith
(SIGNATURE OF APPLICANT)

(DATE)

(SIGNATURE OF APPLICANT)

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INSTRUCTIONS

GENERAL: Send an original copy of the application, exhibits and \$250.00 fee to U.S. Dept. of Agriculture, Agricultural Marketing Service, Grain Division, National Agricultural Library, Beltsville, Maryland 20705. (See Section 180.175 of the regulations and rules of practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM

5 Give the date the applicant determined that he had a new variety based on (1) the definition in Section 41(a) of the Act and (2) the date a decision was made to increase the seed.

13a Give (1), the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method. (2), the details of subsequent stages of selection and multiplication. (3), the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4), evidence of stability.

13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties; (1) identify these varieties and state all differences objectively; (2) Attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

13c Fill in the Exhibit C, Objective Description form for all characteristics, for which you have adequate data.

13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe; such as; plant habit, plant color, disease resistance, etc.

14A If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled or published or the certificate has been issued. However, if the applicant specifies "NO", he may change his choice. (See Section 180.15 of the Regulations and Rules of Practice.)

Exhibit A Revised

Origin and Breeding History of Variety

1. 'Riley' is an 8-clone synthetic. Five parental clones of 'Riley' were derived from 'Cherokee', one from 'Kanza' and one each from polycross progenies of clones that trace to 'Buffalo' and 'Williamsburg'. Source materials were subjected separately to two cycles of phenotypic recurrent selection in the laboratory. 'Cherokee' and the polycross materials were selected from resistance to the pea aphid [*Acyrtosiphon pisum* (Harris)], spotted alfalfa aphid [*Therioaphis maculata* (Buckton)] and bacterial wilt [*Corynebacterium insidiosum* (McCull.) H. L. Jens]. Kanza materials were selected for resistance to the two aphids and bacterial leaf spot [*Xanthomonas alfalfae* (Riker, Jones, and Davis) Dows.]. Selection for resistance to potato leafhopper yellowing [*Empoasca fabae* (Harris)], summer black stem (*Cercospora medicaginis* Ell. and Ev.), and anthracnose [*Colletotrichum trifolii* Bain] were made in the field. Parental clones were selected on the basis of clonal and open pollinated progeny tests. The syn 1 generation was produced by hand crossing the clones in the greenhouse and using equal numbers of plants from each clone to establish the breeder seed field.
2. 'Riley' contains no variants.
3. 'Riley' has been examined for stability and is stable. Genetic drift has not been detected in the breeder and two foundation seed fields separated by at least fifty miles and grown for two or more seasons. Seed increase is on a limited generation basis with one generation each of breeders, foundation, and certified seed classes. All existing seed is not more than two generations removed from and traces to the same breeder's seed lot harvested during a single year. It is anticipated that the existing breeder's seed field will supply the future breeder's seed demand.

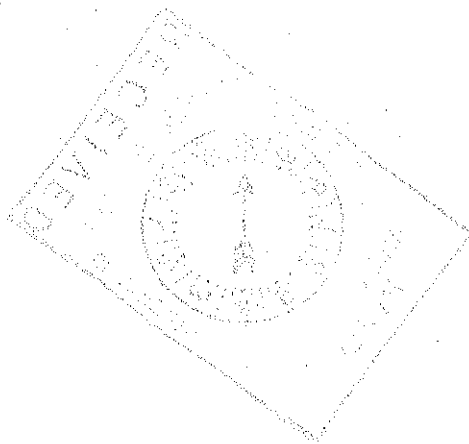


Exhibit B Revised

Novelty Statement

Novelty is based on the unique combination of the following characters:

'Riley' is most similar to 'Cherokee', except (1) it is resistant to bacterial wilt, pea aphid, and spotted alfalfa aphid, (2) it is moderately resistant to rust, and (3) the flower color varies from light to deep purple with a trace (about 1 per 2500 plants) of light cream colored flowers.



Alfalfa (*Medicago sativa* L. complex)

10. GIVE ITEM LENGTH FREQUENCY DISTRIBUTION FOR SUBMITTED AND 1 TO 5 STANDARD VARIETIES 1/

| VARIETY NAME | STEM LENGTH FREQUENCY DISTRIBUTION 2/ | | | | | | | | | | | AVERAGE STEM LENGTH |
|--------------|---------------------------------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------|---------------------|
| | 0 - 5 mm. % | 6 - 10 mm. % | 11 - 15 mm. % | 16 - 20 mm. % | 21 - 30 mm. % | 31 - 40 mm. % | 41 - 50 mm. % | 51 - 60 mm. % | 61 - 70 mm. % | 71 - 80 mm. % | 81 + mm. % | |
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11. FLOWER COLOR 3/ (DETERMINE COLOR ON FRESHLY OPENED FLOWERS)

% PURPLE % VARIEGATED % YELLOW % CREAM % WHITE
 RE 11-20-78 KE 11-22-78 KE 11-28-78

12. DISEASE, INSECT, AND NEMATODE RESISTANCE: (Enter resistance of submitted and check cultivars. Circle check cultivars used.)

| DISEASE | CULTIVAR | % RESISTANT PLANTS | AVG. SEVERITY INDEX (ASI) | ASI LSD .05 | TEST, YEAR & LOCATION 4/ |
|----------------------------|-------------------------|---|---------------------------|-------------|--|
| BACTERIAL WILT | (SUBMITTED) | 51.0 | 38 | 1 | Rosemount, Minnesota 1973 |
| | (RES. CK.) VERNAL | 37.2 | 42 | | |
| | (SUS. CK.) NARRAGANSETT | 0.0 | 00 | | |
| ANTHRACNOSE | (SUBMITTED) | Field data criterion = | garbage | | Manhattan, Kansas, 1973 1975, 1976, 1977. Mead, Nebraska, 1973 |
| | (RES. CK.) ARC | See Table attachment | | | |
| | (SUS. CK.) SARANAC | | | | |
| COMMON LEAF SPOT | (SUBMITTED) | | | | |
| | (RES. CK.) RAMSEY | | | | |
| | (SUS. CK.) RANGER | | | | |
| DOWNY MILDEW | (SUBMITTED) | Resistance criterion = damage scores in | | | Manhattan, Kansas 1973, 1974, 1975, 1977 |
| | (RES. CK.) SARANAC | field. See attachment | | | |
| | (SUS. CK.) KANZA | | | | |
| PHYTOPHTHORA ROOT ROT | (SUBMITTED) | 7.6 | 07 | | St. Paul, Minnesota 1973 |
| | (RES. CK.) AGATE | 47.5 | 43 | | |
| | (SUS. CK.) SARANAC | 2.3 | 02 | | |
| Summer black-stem OTHER | (SUBMITTED) | Resistance criterion = damage scores in | | | Manhattan, Kansas 1975 |
| | (RES. CK.) | field. See table o attachment D | | | |
| | (SUS. CK.) | | | | |

1/ Preferred standards: Saranac, Vernal, Norseman, Lahontan, Mesa Sirsa. Twelve hours light at 25° C with 20,000 lux of cool white florescent; 2,000 lux of incandescent filament light and twelve hours darkness at 5°C.

2/ From cotyledonary node to tip of stem 20 days after planting.

3/ For further clarification consult USDA Agricultural Handbook No. 424.

4/ Give: The institution in charge of test, (2) year, and (3) location of test. Describe test procedure if it differs from procedure suggested in ARS-NC-19, September 1974.

12. DISEASE, INSECT, AND NEMATODE RESISTANCE: (Enter resistance of submitted and check cultivars. Circle check cultivars used.)

| DISEASE | CULTIVAR | % RESISTANT PLANTS | AVG. SEVERITY INDEX (ASI) | ASI LSD .05 | TEST, YEAR & LOCATION 4/ |
|-----------------------|---------------------|--|-----------------------------|-----------------|--------------------------|
| OTHER | (SUBMITTED) | | | | |
| | (RES. CK.) | | | | |
| | (SUS. CK.) | | | | |
| OTHER | (SUBMITTED) | | | | |
| | (RES. CK.) | | | | |
| | (SUS. CK.) | | | | |
| INSECT | CULTIVAR | % SEEDLING SURVIVAL | AVG. SEVERITY INDEX (ASI) | ASI LSD .05 | TEST, YEAR & LOCATION 4/ |
| PEA APHID | (SUBMITTED) | 86.9 | <i>too high</i> | v-3 | Manhattan, Kansas 1974 |
| | (RES. CK.) KANZA | 70.9 | | | |
| | (SUS. CK.) RANGER | 3.1 | | | |
| SPOTTED ALFALFA APHID | (SUBMITTED) | 92.4 | <i>too high</i> | | Manhattan, Kansas 1974 |
| | (RES. CK.) KANZA | 84.3 | | | |
| | (SUS. CK.) RANGER | 1.8 | | | |
| INSECT | CULTIVAR | % DEFOLIATION | AVG. SEVERITY INDEX (ASI) | LSD .05 | TEST, YEAR & LOCATION 4/ |
| ALFALFA WEEVIL | (SUBMITTED) | | | | |
| | (RES. CK.) ARK | | | | |
| | (SUS. CK.) VERNAL | | | | |
| INSECT | CULTIVAR | % RESISTANT PLANTS | EMERGED ADULTS PER PLANT | EMERGED LSD .05 | TEST, YEAR & LOCATION 4/ |
| ALFALFA SEED CHALCID | (SUBMITTED) | | | | |
| | (RES. CK.) LAHONTAN | | | | |
| | (SUS. CK.) SONORA | | | | |
| INSECT | CULTIVAR | % RESISTANT PLANTS | | | TEST, YEAR & LOCATION 4/ |
| POTATO LEAF-HOPPER | (SUBMITTED) | Resistance damage score see Table 6 D. | <i>very strong symptoms</i> | | Manhattan, Kansas 1976 |
| | (RES. CK.) | | | | |
| | (SUS. CK.) | | | | |
| OTHER | (SUBMITTED) | | | | |
| | (RES. CK.) | | | | |
| | (SUS. CK.) | | | | |

4/ Give: The institution in charge of test, (2) year, and (3) location of test. Describe test procedure if it differs from procedure suggested in ARS NC-19, September 1974.

7800099

Exhibit D

Additional Description of the Variety

Exhibit D consists of the completed and attached application for Review of Alfalfa Varieties for Certification.

APPLICATION FOR REVIEW OF ALFALFA VARIETIES FOR CERTIFICATION^{1/}

National Certified Alfalfa Variety Review Board

(The criteria for evaluation of applications were developed by the Joint Alfalfa Work Conference and the Association of Official Seed Certifying Agencies)

APPLICANT'S NAME: Kansas Agricultural Experiment Station and Agricultural Research Service, U. S. Department of Agriculture

ADDRESS: Agronomy Department, Waters Hall, Kansas State University, Manhattan, KS 66506

DATE: June 30, 1977

SPONSORING INSTITUTION (IF OTHER THAN APPLICANT): Same as applicant's name

BREEDER'S NAME (IF OTHER THAN APPLICANT): The variety was developed by E. L. Sorensen, D. L. Stuteville, and E. Horber. Robert J. Raney and H. D. Sunderman assisted with evaluation in Kansas. Performance data outside of Kansas were obtained by D. K. Barnes, F. I. Frosheiser, D. W. Graffis, W. R. Kehr, D. A. Miller, and C. M. Taliaferro. Seed yield comparisons and basic seed for testing was produced by the NC-83 regional project.

VARIETY NAME: Riley

EXPERIMENTAL DESIGNATION: KS43

The breeder or the sponsoring institution or organization must describe and DOCUMENT in this application those characteristics of the variety which give it distinctiveness and merit by supplying the information requested below. Action will be deferred unless application is sufficiently documented.

I. SUMMARIZE HERE THE MAIN ADVANTAGE(S) OVER OTHER VARIETIES, OR OTHER REASONS THIS VARIETY MERITS CERTIFICATION.

Riley has a high level of resistance to anthracnose, bacterial wilt, pea aphid, and spotted alfalfa aphid. It has moderate resistance to summer black stem and downy mildew. Its tolerance to potato leafhopper yellowing is about equal to that of Cherokee.

II. A STATEMENT OF THE ORIGIN AND THE BREEDING PROCEDURES USED IN DEVELOPING THIS VARIETY.

Riley is an eight-clone synthetic variety. Five clones were derived from Cherokee alfalfa. During 1964, one group of seedling Cherokee plants were screened for resistance to the spotted alfalfa aphid and another group to the pea aphid. The two groups of resistant plants were intercrossed by hand in the greenhouse. Utilizing successive elimination in the seedling stage, two cycles of recurrent phenotypic selection were then completed for resistance to the pea aphid, spotted alfalfa aphid, and bacterial wilt.

^{1/} Submit 12 copies of this application to Ed Granstaff, Oklahoma Crop Improvement Association, Agron. Dept., 369 Ag. Hall, Okla. State Univ., Stillwater, Oklahoma 74074. If printed or mimeographed material is enclosed with this application, please send nine copies of such matter.

One clone each was derived from polycross progenies of clones that trace to Buffalo and Williamsburg. The polycross progenies were screened as described for Cherokee.

One clone was derived from Kanza alfalfa by two cycles of selection for bacterial leaf spot, pea aphid, and spotted alfalfa aphid.

Selection of parental clones was based on clonal and O.P. progeny tests in the field. Parental clones were resistant to anthracnose, bacterial wilt, pea aphid, spotted alfalfa aphid, and potato leafhopper.

The syn 1 generation was produced by hand crossing the clones in the greenhouse and using equal numbers of plants from each clone to establish the breeder seed field.

III. AREA OF PROBABLE ADAPTATION AND PRIMARY PURPOSE (HAY, GRAZING, ETC.) FOR WHICH THIS VARIETY WILL BE USED. REPORT STATES AND AREAS WITHIN STATES WHERE THE VARIETY HAS BEEN TESTED, AND PROPOSED AREAS OF RECOMMENDATION AND MERCHANDISING.

Based on its parentage and spring growth, recovery after cutting, and fall dormancy responses (Tables 1, 2), Riley should be adapted to an area similar to that of Buffalo, Cherokee, and Kanza. It has been tested in Illinois, Kansas, Minnesota, Nebraska, and Oklahoma and is currently included in a North Central Region forage yield trial. The variety is intended primarily as a hay crop.

IV. INFORMATION OF VALUE TO FIELD INSPECTORS (SUCH AS UNIFORMITY, LEAF, FLOWER CHARACTERISTICS, ETC.), PHYSIOLOGICAL CHARACTERISTICS, OBVIOUS DISEASE AND INSECT REACTIONS, AND OTHER IDENTIFYING CHARACTERISTICS. REPORT ONLY ON ITEMS YOU CAN DO SO ACCURATELY:

- A. FLOWER COLOR(S): Flower color is various shades of purple with a very low frequency of blue and cream.
- B. PUBESCENCE: Mostly glabrous
- C. UNIFORMITY: Variable growth habit.
- D. FALL AND WINTER DORMANCY (RELATIVE TO RECOGNIZED CHECK VARIETY): Similar to the moderately winter hardy varieties, Kanza and Saranac (Tables 1, 2).
- E. GROWTH HABIT: Upright.
- F. SPECIAL MARKERS: None.
- G. OTHER (INCLUDING OBVIOUS DISEASE AND/OR INSECT CHARACTERISTICS, AND POD COLOR AND SHAPE): Pod coil is typical of Medicago sativa L. Riley has a high level of resistance to anthracnose (Table 3), bacterial wilt (Table 4), pea aphid and spotted alfalfa aphid found in Kansas (Table 5). It is tolerant to potato leafhopper yellowing (Table 6) and frost (Table 7). It is moderately resistant to summer black stem (Table 8) and downy mildew (Table 9).

- V. EVIDENCE OF PERFORMANCE, INCLUDING DATA ON YIELD (IN POUNDS PER ACRE), INSECT OR DISEASE RESISTANCE (STATE CAUSAL ORGANISM, IF KNOWN) AND OTHER FACTORS. DATA MAY BE FROM TESTS CONDUCTED BY PRIVATE FIRMS OR AGRICULTURAL EXPERIMENT STATIONS, AND SHALL INCLUDE RECOGNIZED RESISTANT AND SUSCEPTIBLE CHECK VARIETIES (SEE PUB ARS NC-19). A STATEMENT AND/OR DATA MUST BE INCLUDED ON THE FOLLOWING SIX ORGANISMS: PHYTOPHTHORA ROOT ROT, ANTHRACNOSE, SPOTTED ALFALFA APHID, PEA APHID, STEM NEMATODE, AND BACTERIAL WILT.

A. FORAGE PRODUCTION

1. YIELD AT SPECIFIED LOCATIONS (ATTACH TABULAR DATA): Forage yields have been equal or greater than those of check varieties in Illinois, Kansas, Nebraska, and Oklahoma (Tables 10-15).
2. PERSISTENCE (WINTER AND DROUGHT TOLERANCE, SUMMER SURVIVAL, ETC.): No long term persistence data are available for Riley. Persistence has been excellent in a four-year-old trial at Manhattan, Kansas. Based on available fall dormancy data (Tables 1,2) winter hardiness should at least equal that of Kanza. Its resistance to insects and diseases should aid survival and long term forage production.
3. FINENESS OF STEM: Medium.
4. DISEASE RESISTANCE (STATE EXTENT OF RESISTANCE IF NOT IMMUNE): Riley has a high level of resistance to anthracnose (Table 3) and bacterial wilt (Table 4). It has moderate resistance to summer black stem (Table 8) and downy mildew (Table 9). It is susceptible to Phytophthora root rot (Table 16) and its resistance to stem nematode is unknown.
5. INSECT RESISTANCE OR TOLERANCE (GIVE EXTENT OF SAME): Resistance of Riley to pea aphids and spotted alfalfa aphids in Kansas exceeds that of Kanza. Its tolerance to potato leafhopper yellowing is similar to that of Cherokee.
6. LODGING: No information available.
7. OTHER: Riley has tolerance to frost.

B. SEED PRODUCTION

1. COMPARATIVE YIELD AT SPECIFIED LOCATIONS (ATTACH TABULAR DATA): Seed yields of Riley were comparable to those of Ranger in California and Idaho (Table 17).

Variety Description - Riley

1. Riley is an 8-clone synthetic whose parentage traces to Cherokee (5), Kanza (1), and polycross progenies of Buffalo (1) and Williamsburg (1). Source materials were subjected separately to phenotypic recurrent selection in the laboratory - Cherokee and the polycross materials for resistance to the pea aphid, spotted alfalfa aphid and bacterial wilt; Kanza for resistance to the aphids and bacterial leaf spot. Selection for resistance to the potato leafhopper, summer black stem and anthracnose were made in the field. Parental clones were selected on the basis of clonal and O.P. progeny tests.
2. The probable area of adaptation is similar to that of Buffalo, Cherokee, and Kanza. Tests have been conducted in Illinois, Minnesota, Nebraska, Kansas and Oklahoma. Riley is intended primarily as a hay crop.
3. Riley has a high level of resistance to anthracnose, bacterial wilt, pea aphid, and spotted alfalfa aphid biotypes present in Kansas. It has moderate resistance to summer black stem and downy mildew and tolerance to potato leafhopper yellowing. Riley is susceptible to Phytophthora root rot and stem nematode reaction is not known. Flower color is various shades of purple with a low frequency of cream and blue.
4. Seed increase shall be on a limited generation basis with one generation each of breeder, foundation, and certified seed classes. Breeder (syn 2) and foundation (syn 3) seed is produced in Kansas under the auspices of the Kansas Agricultural Experiment Station. Certified seed (syn 4) may be grown only from foundation seed.
5. Certified seed will be offered for sale after the 1978 harvest.
6. No decision has been made for plant variety protection.

- VI. PROCEDURE FOR MAINTAINING STOCK SEED, SEED CLASSES TO BE USED, AGE OF STAND, A STATEMENT AS TO THE LIMITATION OF GENERATIONS THAT MAY BE CERTIFIED, AND ANY OTHER REQUIREMENTS OR LIMITATIONS NECESSARY TO MAINTAIN VARIETAL CHARACTERISTICS*.

Seed increase shall be on a limited generation basis with one generation each of breeder, foundation, and certified seed classes. Breeder (syn 2) and foundation (syn 3) seed is produced in Kansas under the auspices of the Kansas Agricultural Experiment Station. Certified seed (syn 4) may be grown only from foundation seed.

- VII. IF THIS VARIETY IS ACCEPTED BY OFFICIAL CERTIFYING AGENCIES, WHEN WILL CERTIFIED SEED FIRST BE OFFERED FOR SALE:

After 1978 seed harvest.

- VIII. WILL APPLICATION BE MADE FOR PROTECTION UNDER CERTIFICATION PROVISION OF THE PLANT VARIETY PROTECTION ACT?

No decision made.

Signature of Applicant

* At the time a variety is accepted for certification, a sample seed lot of the generation or generations requested by the certifying agency shall be submitted to the certifying agency by the sponsor. This lot(s) is to be retained as a control sample against which all future seed stocks released for certified seed production may be compared to establish continued trueness to variety.

RILEY

1. Riley is an 8-clone synthetic alfalfa variety. Five clones were derived from Cherokee, one from Kanza, and one each from polycross progenies of Buffalo and Williamsburg. Source materials were subjected separately to phenotypic recurrent selection in the laboratory. Cherokee and the polycross materials were screened for resistance to the pea aphid, spotted alfalfa aphid and bacterial wilt. Kanza was screened for resistance to the two aphids and bacterial leaf spot. Selection for resistance to the potato leafhopper, summer black stem and anthracnose were made in the field. Parental clones were selected on the basis of clonal and O.P. progeny tests.
2. Based on its parentage and spring growth, recovery after cutting, and fall dormancy responses, Riley should be adapted to an area similar to that of Buffalo, Cherokee, and Kanza. It has been tested in Illinois, Kansas, Minnesota, Nebraska, and Oklahoma. The variety is intended primarily as a hay crop.
3. Riley has a high level of resistance to anthracnose, bacterial wilt, pea aphid, and spotted alfalfa aphid. It is moderately resistant to summer black stem and downy mildew. Riley has tolerance to frost and potato leafhopper. Flower color is various shades of purple with a very low frequency of cream and blue. Seed pods are typical of Medicago sativa.
4. Seed increase shall be on a limited generation basis with one generation each of breeder, foundation, and certified seed classes. Breeder (syn 2) and foundation (syn 3) seed is produced in Kansas under the auspices of the Kansas Agricultural Experiment Station. Certified seed (syn 4) may be grown only from foundation seed.
5. Certified seed will be offered for sale after the 1978 harvest.
6. No decision has been made for plant variety protection.

Table 1. Spring, summer, and fall growth at Manhattan, Kansas.

| Variety | 1974 trial Height (cm) 1975 | | | 1975 trial Height (cm) 1976 | | |
|-----------|--------------------------------|------|------|--------------------------------|------|------|
| | 4-24 | 6-11 | 9-16 | 4-6 | 7-6 | 10-6 |
| Riley | 25.3 | 39.3 | 27.0 | 22.8 | 43.5 | 19.3 |
| Arc | 24.5 | 37.3 | 27.7 | 23.0 | 41.3 | 19.0 |
| Cody | 25.0 | 41.0 | 31.3 | 22.8 | 44.0 | 19.7 |
| Dawson | 21.3 | 33.8 | 19.0 | 20.3 | 37.3 | 14.0 |
| Kanza | 26.0 | 39.3 | 27.7 | 21.3 | 43.0 | 19.0 |
| Saranac | 24.5 | 39.5 | 26.0 | 21.0 | 42.0 | 17.0 |
| Team | 24.0 | 36.8 | 26.7 | 22.3 | 38.5 | 17.7 |
| LSD (.05) | 2.1 | 2.5 | 3.3 | ---- | ---- | ---- |

Table 2. Spring and fall growth habits, and rate of recovery after cutting at Mead, Nebraska and rate of recovery at Manhattan, Kansas, 1973.

| Variety | Growth habit ^{1/} | | Rate of recovery ^{2/} | |
|---------|----------------------------|------|--------------------------------|-----------|
| | Spring | Fall | Mead | Manhattan |
| Riley | 3.5 | 3.8 | 3.5 | 2.5 |
| Agate | 2.5 | 4.8 | 3.0 | --- |
| Arc | 1.2 | 2.8 | 3.8 | 3.5 |
| Cody | | | | 2.8 |
| Dawson | 3.5 | 5.2 | 3.2 | 4.8 |
| Kanza | 2.8 | 3.2 | 2.8 | 4.0 |
| Ramsey | 2.5 | 4.8 | 4.2 | --- |
| Saranac | 1.8 | 3.5 | 2.8 | 2.8 |
| Vernal | 3.5 | 5.8 | 4.8 | --- |

^{1/}Visual scores: 1 = erect, 9 = prostrate.

^{2/}Visual scores: 1 = most rapid, 9 = least rapid.

Table 7. Frost damage to alfalfa varieties.

| Variety | Manhattan Kansas 12-12-73 ^{1/} | Mead Nebraska 5-14-76 ^{1/} | Manhattan Kansas 11-10-76 ^{1/} |
|-----------|---|---|---|
| Riley | 4.0 | 1.2 | 2.0 |
| Agate | 6.8 | 2.0 | --- |
| Arc | 5.2 | 4.2 | --- |
| Cody | 6.2 | --- | --- |
| Dawson | 6.5 | 2.0 | --- |
| DuPuits | 7.5 | --- | --- |
| Kanza | 5.2 | 1.5 | 4.0 |
| Ramsey | 6.2 | 1.5 | --- |
| Saranac | 6.0 | 3.0 | --- |
| Vernal | 5.8 | 1.2 | --- |
| LSD (.05) | 1.1 | --- | --- |

^{1/}Visual scores: 1 = least, 9 = most.

Table 8. Summer black stem damage
(Manhattan, Kansas).

| Variety | Damage score ^{1/} 8-27-75 |
|-----------|---------------------------------------|
| Riley | 3.5 |
| Arc | 5.5 |
| Cody | 5.3 |
| Dawson | 5.0 |
| Kanza | 5.0 |
| Saranac | 6.0 |
| Vernal | 4.0 |
| LSD (.05) | 1.1 |

^{1/}Visual scores: 1 = least, 9 = most.

Table 15. Average forage yields in trials at Urbana, Illinois and Stillwater, Oklahoma.

| Variety | Tons dry matter per acre | | | |
|-----------|--------------------------|--------------------|-----------------------|--------------------|
| | Urbana | | Stillwater | |
| | 1974-76 ^{1/} | 1976 ^{2/} | 1974-76 ^{3/} | 1976 ^{3/} |
| Riley | 5.25 | 4.12 | 2.48 | 1.94 |
| Arc | 5.53 | ----- | 2.52 | ----- |
| Dawson | 4.94 | 3.58 | 2.53 | 2.03 |
| Kanza | 5.29 | 3.70 | 2.52 | 2.09 |
| Saranac | 4.93 | 3.97 | 2.19 | 1.75 |
| Vernal | 5.34 | 3.87 | 2.35 | 1.54 |
| LSD (.05) | 0.41 | 0.25 | ----- | 0.34 |

^{1/} Seeded 4-30-73.^{2/} Seeded 4-6-76.^{3/} Seeded 5-10-73.

Table 16. 1973 Phytophthora root rot trial (St. Paul, Minnesota).

| Variety | Number plants/disease severity class ^{1/} | | | | | | Average Severity Index | % Resistant Plants ^{2/} |
|-----------|--|-----|-----|-----|-----|----|------------------------|----------------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | | |
| Riley | 2 | 20 | 113 | 54 | 55 | 44 | 3.94 | 7.6 |
| Agate | 74 | 208 | 194 | 44 | 24 | 49 | 2.80 | 47.5 |
| Kanza | 0 | 7 | 64 | 74 | 32 | 18 | 3.95 | 3.6 |
| Saranac | 2 | 10 | 118 | 138 | 171 | 89 | 4.38 | 2.3 |
| Vernal | 7 | 18 | 131 | 146 | 138 | 68 | 4.17 | 4.9 |
| LSD (.05) | | | | | | | 0.50 | |
| CV (%) | | | | | | | 9.5 | |

^{1/} Phytophthora injury scored 1 to 6: 1 = plant healthy, 6 = plant dead.^{2/} Plants scored 1 and 2 considered resistant.

Exhibit D Supplement

Additional Description of the Variety

'Arc', 'Buffalo', 'Cherokee', 'Kanza', and 'Riley' are members of a group of alfalfa varieties which are similar in winterhardiness (moderately hardy and adapted to the Central alfalfa region), but differ in disease and insect resistance. The varietal differences in disease and insect reaction are useful for distinguishing among varieties within the group as shown in the following table:

| Variety | Bacterial ^{1/} Wilt | Pea ^{2/} aphid | Spotted ^{3/} alfalfa aphid | Potato ^{4/} leafhopper yellowing | Rust ^{5/} |
|----------|---------------------------------|----------------------------|---|---|--------------------|
| Arc | S ^{6/} | MR | S | S | MR |
| Buffalo | MR ^{7/} | S | S | S | S |
| Cherokee | S | S | S | R | R |
| Kanza | R ^{8/} | R | R | S | S |
| Riley | R | R | R | R | MR |

1/ Bacterial wilt [*Corynebacterium insidiosum* (McCull.) H.L. Jens].

2/ Pea aphid [*Acyrtosiphon pisum* (Harris)].

3/ Spotted alfalfa aphid [*Therioaphis maculata* (Buckston)].

4/ Potato leafhopper yellowing [*Empoasca fabae* (Harris)].

5/ Rust [*Uromyces striatus* (Schroet.)].

6/ S = Susceptible.

7/ MR = Moderately resistant.

8/ R = Resistant.

Table 3. Anthracnose damage.

| Variety | Damage ^{1/} | | | | |
|-------------|----------------------|-------------------|---------|--------|--------|
| | Mead, Nebraska | Manhattan, Kansas | | | |
| | 9-4-73 | 8-1-73 | 8-27-75 | 9-2-76 | 6-3-77 |
| Riley | 1.2 | 3.0 | 2.8 | 2.8 | 2.8 |
| Agate | 1.2 | 4.2 | --- | --- | --- |
| Arc - R | 1.2 | 2.8 | 1.8 | 2.5 | 2.5 |
| Cody | --- | 4.5 | --- | 4.0 | 3.8 |
| Dawson | 3.2 | 4.2 | 3.3 | 5.0 | 5.5 |
| Kanza | 1.2 | 4.0 | 2.5 | 3.5 | 3.8 |
| Ramsey | 1.2 | 4.2 | --- | --- | --- |
| Saranac - S | 3.2 | 5.2 | 5.8 | 5.0 | 6.5 |
| Vernal | 1.8 | 4.5 | 2.3 | 4.0 | 5.2 |
| LSD (.05) | --- | 1.1 | 1.2 | 1.2 | 0.9 |

^{1/}Visual scores: 1 = least, 9 = most.

Table 4. Bacterial wilt resistance (Rosemount, Minnesota), 1973.

| Variety | Average severity index | % plants resistant |
|--------------|------------------------|--------------------|
| Riley | 1.83 | 51.0 49 |
| Kanza | 2.22 | 43.3 42 |
| Narragansett | 4.42 | 0.0 00 |
| Ranger | 2.98 | 15.3 |
| Vernal | 2.29 | 37.2 |
| LSD (.05) | 0.41 | |
| CV (%) | 9.9 | |

Table 5. Percentage seedling survival of experimental alfalfas and alfalfa cultivars after infestation with aphids.

| Entry | Pea Aphid | Spotted Alfalfa Aphid |
|-----------|-----------|-----------------------|
| KS 30 | 88.6 | 95.7 |
| KS 34 | 90.1 | 79.9 |
| KS 38 | 91.9 | 85.8 |
| KS 48 | 80.6 | 86.8 |
| KS 49 | 85.5 | 93.8 |
| KS 50 | 82.6 | 92.5 |
| KS 51 | 79.9 | 90.3 |
| Kanza | 70.9 | 84.3 |
| Riley | 86.9 | 92.4 |
| Ranger | 3.1 | 1.8 |
| LSD (.05) | 11.3 | 7.8 |
| CV (%) | 8.8 | 6.0 |

Table 6. Potato leafhopper damage (Manhattan, Kansas).

| Variety | Leafhopper yellowing ^{1/} 7-22-76 |
|-----------|---|
| Riley | 3.6 |
| Buffalo | 4.7 |
| Cherokee | 3.4 |
| Kanza | 4.4 |
| Lahontan | 5.2 |
| Ranger | 4.8 |
| LSD (.05) | 0.4 |

^{1/}Visual scores: 1 = least, 9 = most.

Table 9. Downy mildew damage (Manhattan, Kansas).

| Variety | Damage scores ^{1/} | | | |
|-----------|-----------------------------|--------|---------|---------|
| | 6-6-73 | 6-4-74 | 6-11-75 | 6-14-77 |
| Riley | 4.0 | 3.8 | 4.0 | 3.8 |
| Agate | 3.8 | --- | --- | --- |
| Arc | 4.0 | 4.0 | 4.0 | 3.8 |
| Cody | 4.5 | 4.8 | 5.7 | 5.2 |
| Dawson | 5.8 | 5.8 | 6.0 | 4.8 |
| DuPuits | 2.0 | --- | --- | --- |
| Kanza | 5.0 | 5.3 | 4.7 | 4.5 |
| Ramsey | 4.0 | --- | --- | --- |
| Saranac | 2.8 | 2.8 | 2.3 | 3.0 |
| Vernal | 4.5 | --- | 4.0 | 4.2 |
| LSD (.05) | 0.7 | 0.9 | 0.8 | --- |

^{1/}Visual scores: 1 = least, 9 = most.

Table 10. Forage yields from 1973 forage yield trial (Manhattan, Kansas).

| Variety | Tons dry matter per acre | | | Total yield for trial |
|-----------|--------------------------|----------------|----------------|-----------------------|
| | 1973 3 cuts | 1974 4 cuts | 1975 4 cuts | |
| Riley | 7.33 | 10.10 | 9.84 | 27.27 |
| Agate | 6.09 | 7.27 | 7.91 | 21.27 |
| Arc | 6.64 | 8.57 | 8.50 | 23.71 |
| Cody | 6.29 | 8.15 | 8.62 | 23.06 |
| Dawson | 6.39 | 7.05 | 7.31 | 20.75 |
| DuPuits | 5.78 | 6.46 | 7.06 | 19.30 |
| Kanza | 6.53 | 8.57 | 9.06 | 24.16 |
| Ramsey | 5.88 | 8.27 | 8.24 | 22.39 |
| Saranac | 6.34 | 7.83 | 8.03 | 22.20 |
| Vernal | 6.28 | 8.14 | 8.07 | 22.49 |
| LSD (.05) | 0.44 | 0.52 | 0.55 | |